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Evaluation of Hepatoprotective Effects of Rauwolfia Vomitoria Extract on Liver Enzymes of Adult Wistar Rats.

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ABSTRACT

This work is aimed at investigating the hepatoprotective effects of *Rauwolfia vomitoria* extract on liver enzymes following oral administration. Twenty wistar rats of weights 195 -215kg were divided into four groups designated as A,B,C & D. Group A served as the control and received 0.4ml of distilled water; the experimental groups B,C &D were orally administered with 0.6ml, 0.75ml and 0.81ml of extract of *Rauwolfia vomitoria* for twenty eight days. Twenty four hours after the last administration, the animals were weighed, anaesthetized under chloroform vapour and dissected. The liver tissues were removed and weighed. Blood samples were collected through cardiac puncture using sterile syringes and needles. Blood for serum preparation was collected into sterile plain tubes and stored in the refrigerator for analysis. The activities of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphotase (ALP) were determined using randox kit method. The final body weight of the experimental groups (B,C & D) increased significantly ($P<0.001$)with the control. The relative liver weight of the experimental groups (B,C &D) statistically increased ($P<0.001$) relative to the control (A). The activity levels of aspartate aminotransferase (AST), alinine aminotransferase (ALT) and alkaline phosphotase (ALP) in the experimental groups (B,C &D) are similar with the control (A). This study therefore suggest that consumption of *Rawuwofia vomitoria* extract at different doses did not cause any biochemical alterations in the liver enzymes.

Keyword: Wistar rats, *Rauwolfia vomitoria*, Liver weight, Body weight, Hepatoprotective effects.

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INTRODUCTION

Rauwolfia vomitoria is a common herb used traditionally for psychiatric management in Nigeria[1]. Its extracts have anti-inflammatory effect, antipyretic effect and anti-cancer effect due to the β-carboline alkaloid alstonine [2].

From 1931, Indian doctors researched on possible way of utilization of *Rauwolfia vomitoria* in neuro-Psychiatry. The extract from this plant was first extracted by Swiss chemist in 1952 and becomes the first natural neuroteptic. Today, this plant is still the source of a lot of drugs used in Psychiatry [3]. In traditional medicine, the roots and leaves of *Rauwolfia vomitoria* are brewed as tea and used in humans for treatment of hypertension, insanity, snake bite and cholera[4].

A bioactive carboline alkaloid, alstonine present in the root and leafs of *Rauwolfia vomitoria* have anti-cancer activity[5] while the antipyretic effect of the leaf extract has also been demonstrated[7]. Folk medicine uses of the roots are extensive, particularly for their emetic, purgative, dysenteric, abortive and insecticidal properties[8].

Liver is the key organ for homeostasis in the body. It is involved in all the biochemical pathways related to growth and other functions in the body. Because of its unique metabolism it is the target organ for toxicity, xenobiotics and oxidative stress[9].

In toxicity studies, the majority of the aspartate aminotransferase and alanine animotransferase enzymes measured as indices of drug metabolism are released into the blood serum when cells are damaged or their functions are disrupted. Cell membrane integrity are accessed by its ability to prevent enzyme leakage is dependents on intracellular energy. The cell membrane is therefore impermeable to enzymes as long as cells are metabolizing normally [10,11] This study therefore aims at investigating the effects of *Rauwolfia Vomitoria* extract on liver enzymes in adult wistar rats.

MATERIALS AND METHOD

Breeding of Animals

Twenty wistar rats were procured from animal house of Anatomy Department, University of Calabar, Cross River State, Nigeria. The ethical committee permission were gotten from faculty of basic medical sciences Nnamdi Azikiwe University and University of Uyo. They were bred in the animal house of University of Uyo Akwa Ibom State. They were allowed for a period of seven days for acclimatization under normal temperature (27^oC – 30^oC) before their weights were taken. They were fed ad libitum with water and guinea feed pallets from Agro mill Nigeria Ltd.

Drug Preparation

Rauwolfia vomitoria leaves were plugged from Eket in Akwa Ibom State. The plant leaves were identified and authenticated at herbarium unit of botany department, University of Uyo, Akwa Ibom State and dried in an oven at a temperature of 50^{o}C and crushed using laboratory blender. Extraction of the extract was done using ethanol. 300mg of the extract/kg body weight were dissolved in 10mls of distilled water and administered to the animals.

Experimental Protocols

The animals were divided into four groups A,B,C,& D, each containing five rats. Group A animals served as the control which were orally administered with 0.4ml of distilled water daily for twenty eight days. The other groups B,C & D served as the experimental groups and received 0.6ml, 0.7ml and 0.81ml of *Rauwolfia vomitoria* for twenty eight days respectively. Both the control animals and experimental groups were weighed after the last administration, sacrificed using chloroform inhalation method. Liver tissues were removed and weighed. Blood samples were collected by cardiac puncture using sterile syringes and needles. Blood for serum preparation was collected into sterile plain tubes without anti-coagulant. Serum samples were separated from the cloth by centrifugation at 3,00pm for 5 minutes using bench top centrifuge. Serum samples were separated into sterile plain tubes and stored in the refrigerator for analysis. Activities of serum aspartate aminotransferase (AST), alanine aminostransferae (ALT) and alkaline phosphotase were carried out using randox kit method.

RESULTS AND DISCUSSION

Morphometric Analysis of Body Weights

Table 1: Comparison of mean initial and final body weight and weight change in all the group (A,B,C &D).

	GP.A	GP.B	GP.C	GP.D	F-RATIO	PROB. OF SIG
Initial Body WT.	196.20± 4.30	198.70± 5.20	199.80± 7.20	206.40± 6.30	69.240	<0.001
Final Body WT.	219.40± 6.40	225.30± 7.60	228.10± 5.70	231.40± 4.70	42.440	<0.001
WT. Change	23.00± 6.70	27.10± 5.50	29.50± 3.60	25.60± 4.20	20.150	<0.001

(Mean ±SEM given for each measurement)

The final body weight for the experimental groups B,C &D increased significantly (P<0.001) relative to the control (A).

Morphometric Analysis of liver Weight

Table 2: Comparison of mean relative liver weight of group A and experimental groups B,C & D.

	GP.A	GP.B	GP.C	GP.D	F-RATIO	PROB.OF SIG
LIVER WT.	4.90±0.201	5.10±0.161	5.60±0.420	5.98±0.700	56.90	<0.001

(Mean ± SEM given for each measurement)

The relative liver weight for the experimental groups B,C & D increased significantly (P<0.001) relative to the control (A).

ACTIVITIES OF SERUM LEVELS OF ASPARTATE AMINOTRANSFERASE (AST), ALANINE AMINOTRANSFERASE (ALT) AND ALKALINE PHOSPHOTASE (ALP)

Table 3: Comparison of Activities Of Serum Levels Of Aspartate Aminotransferase (Ast), Alanine Aminotransferase (Alt) And Alkaline Phosphotase (Alp)

(Mean ± SEM given for each measurement)

	GP.A	GP.B	GP.C	GP.D	F-RATIO	PROB.OF SIG
AST	76.80±4.20	77.20±6.60	78.50±5.20`	79.50±6.70	30.06	<0.001
ALT	60.10±3.70	61.10±5.80	62.90±3.60	63.99±7.60	32.06	<0.001
ALP	190.10±5.50	191.85±4.40	192.10±3.40	194.20±6.10	12.20	<0.001

From the result obtained from calculations of activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphotase (ALP), the experimental groups B,C & D activity level in aspartate amino transferase, alanine aminotransferase and alkaline phosphotase increased significantly (P<0.001) relative with the control.

Liver is the key organ regulating homeostasis in the body. It is involved with almost all the biochemical pathways related to many functions in the body.

The result of this study agree with previous researchers that *Rauwolfia vomitoria* could be hepatoprotective to the liver enzymes of wistar rats.

There were no significant difference (P<0.001) in the serum and tissues levels of aspartate aminotransfrease (AST), alanine aminotransferase (ALT) and alkaline phostotase (ALP) in the experimental groups treated with *Rauwolfia vomitoria* extract compared with the control as shown in table (3). These results indicated that the extract of *Rauwolfia vomitoria* did not bring about cellular damage in the liver during the experimental period. Enzyme activities in the serum and tissues are often used as maker to ascertain toxic effects of administered foreign compounds to the experimental animal[9]. ALP is a membrane bound enzyme[10.] While ALT and AST are cytosolic enzymes[11]. These enzymes are highly concentrated in the liver and kidney and are found in serum in significant quantities when cell membrane becomes leaky or ruptured[12,13]. A

rise in serum level or decrease in tissue level of these intracellular enzymes is an index of damage to the liver cells[14]

Observation of the body weight reveals gradual increase in weight of animals in the experimental groups relative to the control. This showed that extract of *Rauwolfia vomitoria* functions primarily as a dietary supplement enhancing growth.

The relative weights of organ also showed statistically related values with the control. This could be as a result of anti-oxidant properties of *Rauwolfia vomitoria.*

CONCLUSION

The extract of *Rauwolfia vomitoria* did not induce adverse alterations in biochemical parameters of serum aspartate aminotrasfrease (AST), alanine aminotransferase (ALT) and alkaline phosphotase (ALP) and no histopathological lesions was observed in liver tissues of rats. This study has demonstrated protective effects of *Rauwolfia vomitoria* extract on liver enzymes of wistar rats.

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